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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/556,952	04/21/2000	Cherie R. Kagan	YOR9-2000 0186US1	6543

7590

05/01/2002

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EXAMINER

LORENZO, JERRY A

ART UNIT

PAPER NUMBER

1734

5
DATE MAILED: 05/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-5

Office Action Summary

Application No.

09/556,952

Applicant(s)

KAGAN ET AL.

Examiner

Jerry A. Lorengo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 14-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 13 is/are rejected.
- 7) ☒ Claim(s) 12 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2. 6) ☐ Other: _____

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DETAILED ACTION

(1)

Election/Restrictions

This application contains claims directed to the following patentably distinct species of the claimed invention:

First Species: a method of forming a patterned thin film on a substrate through the use of a stamp from which a self-assembled monolayer (SAM) is transferred to the substrate; and

Second Species: a method of forming a patterned thin film on a substrate by contacting the substrate with solution comprising an organic molecular species capable of forming a SAM on the substrate followed by modification of the SAM by radiation exposure through a mask.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 1-4 generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with Mr. Dan Morris on April 25, 2002 a provisional election was made without traverse to prosecute the invention of generic claims 1-4 and the first species encompassed by claims 5-13. Affirmation of this election must be made by applicant in

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replying to this Office action. Claims 14-29 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

(2)

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 5 recites the limitation "said patterned and unpatterned regions" in lines 10 and 11. There is insufficient antecedent basis for this limitation in the claim.

The lack of antecedent basis explained above renders claim 5 further indefinite because it is not understood by the examiner how the tail group chemically differentiates the coated surface of the stamp. It has been assumed for examination purposes that the tail group is capable of interacting with surface of the stamp thereby enabling the formation of a SAM upon of the stamp surface.

(3)

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2 and 4-11 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,512,131 to Kumar et al.

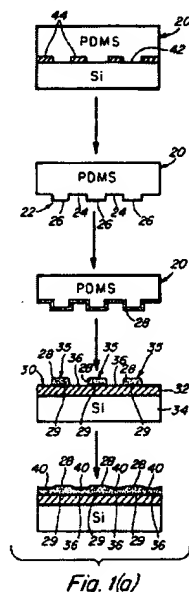
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Regarding applicant claim 1, Kumar et al. disclose a method of forming a patterned this film comprising the steps of;

(1) providing a substrate 32,34 having a patterned layer of a self-assembled monolayer (SAM) 35 thereon; and

(2) depositing a thin film 40 thereover (Figure 1(a); column 5, lines 62-67; column 1-14).

The method of Kumar et al. is illustrated below:



Regarding applicant claim 2, Kumar et al. disclose that the substrate 32,34 may comprise metals, metal alloys, metal oxides, doped or undoped silicon, i.e., semiconductors, or polymers (column 10, lines 45-67; column 11, lines 1-8; column 14, lines 41-61).

Regarding applicant claim 4, Kumar et al. disclose that the substrate is a solid that may have a planar (as seen in Figure 1(a)) or any nonplanar surface exhibiting curves, corners, etc. (column 17, lines 18-21).

Regarding applicant claim 5, Kumar et al. disclose that the SAM pattern 35 disposed on the surface 30 of the substrate 32,34 may be provided by a stamping process comprising the steps of:

(1) providing a stamp 20 having a patterned surface 22 (Figure 1(a); column 5, lines 62-67; column 6, line 1);

(2) coating the surface 22 of the stamp 20 with an organic molecular species 28 terminating in a first end (head functional group) capable of binding to the surface 30 of the

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substrate 32,34 and a second end (tail functional group) capable of interacting with the surface 22 of the stamp 20 (column 6, lines 1-3; column 10, lines 14-16; column 11, lines 23-27);

(3) placing the coated surface 22 of the stamp 20 in contact with the surface 30 of the substrate 32,34 for an amount of time to allow the first end functional group to bind thereto (Figure 1(a); column 6, lines 3-10); and

(4) removing the stamp to provide a SAM of the molecular species 28 on surface 30 of the substrate 32,34 (Figure 1(a); column 6, lines 10-14).

Regarding applicant claims 6-9, Kumar et al. disclose that the stamp is elastomeric (column 8, lines 35-38) having a surface exhibiting indented 24 and non-indented areas 26 (Figure 1(a); column 6, lines 29-32) which is capable of transferring the molecular species 28 to the surface 30 of the substrate 32,34 in a pattern defined by the topography of the stamp (Figure 1(a); column 6, lines 33-39).

Regarding applicant claim 9, Kumar et al. disclose that the first end (head) functional group may comprise thiols, sulfides and disulfides (column 11, lines 9-21).

Regarding applicant claim 10, Kumar et al. disclose that the second end (tail) functional group may comprise hydroxyl, hydrocarbon, halogenated hydrocarbon, carboxyl, etc. (column 11, lines 23-63)

Regarding applicant claim 11, Kumar et al. disclose that the molecular species 28 may comprise a hydrocarbon as well as halogenated hydrocarbons (column 12, lines 10-25).

(4)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,512,131 to Kumar et al.

Although Kumar et al., as set forth in section (3), above, disclose that the substrate is a solid that may have a planar (as seen in Figure 1(a)) or any nonplanar surface exhibiting curves, corners, etc. (column 17, lines 18-21), they do not specifically disclose, as per applicant claim 3, that the substrate is an irregularly shaped substrate.

Nonetheless, it would have been obvious to one of ordinary skill in the art at the time of invention to utilize the method of Kumar et al. to pattern a substrate having an irregular shape motivated by the fact that Kumar et al. contemplates such nonplanar surfaces given his teaching that the stamp is advantageously chosen to be elastic, such that the stamping surface 26 may very closely conform to irregularities in a surface (column 7, lines 30-41).

(5)

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,512,131 to Kumar et al. in view of U.S. Patent No. 6,020,047 to Everhart and U.S. Patent No. 5,059,258 to Wefers et al.

Kumar et al., as set forth in section (3), above, disclose a method for the formation of a patterned thin film on a substrate having a patterned SAM underlayer provided thereon through the use of patterned stamp. Although Kumar et al. disclose that the molecular species 28 may be based upon various phosphate species (column 11, lines 42-63), he does not specifically disclose,

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as per applicant claim 13, that the organic molecular species comprises octadecylphosphonic acid.

Wefers et al., however, also drawn to the formation of SAM of various phosphonic molecular species on substrates discloses that phosphonic species such as octadecylphosphonic acid are known for use in the formation of SAMs on oxidized metal substrates (Figure 1; column 4, line 6).

It would have been obvious to utilize phosphonic species, such as the octadecylphosphonic acid taught by Wefers et al., in the method of Kumar et al. motivated by the fact that Everhart, also drawn to methods for the deposition of a thin film material on a surface of a substrate having thereon a patterned underlayer of a SAM deposited through stamping (Figure 1) discloses that SAMs of phosphonic acid are useful in patterning metal or metal alloy coated substrates (column 3, lines 14-26).

(6)

Allowable Subject Matter

Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: Methods for the formation of a patterned thin film on a substrate having a patterned SAM underlayer provided thereon through the use of patterned stamp, such as taught by U.S. Patent Nos. 5,512,131 to Kumar et al. and 6,020,047 to Everhart, are known in the art.

Although it is also known, as suggested by Jeon et al. in "Patterning of dielectric oxide thin layers by microcontact printing of self-assembled monolayers", to utilize octyltrichlorosilanes as the organic molecular species for forming the SAMs, none of the prior art specifically teaches or suggests such a method wherein the organic molecular species for forming the SAMs specifically comprises (tridecafluoro-1,1,2,2-tetrahydrooctyl)trichlorosilane.

(7)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry A. Lorengo whose telephone number is (703) 306-9172. The examiner can normally be reached on Monday through Friday, 8:30 A.M. to 5:00 P.M.

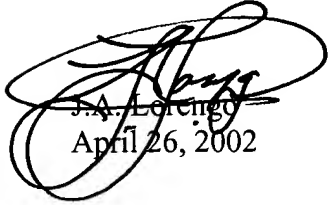
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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on (703) 308-3853. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-7115 for regular communications and (703) 305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



J.A. Lorenzo
April 26, 2002